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AMERICAN DANCE FLIES OF THE
DRAPETIS ASSIMILIS SPECIES GROUP
(DIPTERA: EMPIDIDAE)

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ABSTRACT: Eight American species are newly recognized as belonging to the *Drapetis assimilis* species group, including five new species described herein: *Drapetis arnaudi* n. sp. from Florida; *D. cerina* n. sp. from New Mexico; *D. destituta* n. sp. from Baja California; *D. solaris* n. sp. from Mexico (Distrito Federal); and *D. torulosa* n. sp. from Baja California. Lectotypes are designated for *D. latipennis* Melander, 1902 and *D. discalis* Melander, 1918. *Drapetis discalis* Melander is removed from *Crossopalpus* Bigot and redescribed. *Drapetis infumata* Melander is redescribed. A key to American species is provided.

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INTRODUCTION

Flies of the genus *Drapetis* are tiny cursorial predators that are seldom observed or collected. Members of the *D. assimilis* species group have been found on tree trunks and in flowers, and reared from litter in hollow trees; their other habits are unknown.

The *D. assimilis* group was first alluded to by Collin (1961) in discussing characters shared by the Palearctic species, *Drapetis assimilis* Fallén, *D. simulans* Collin, and *D. arcuata* Loew. Subsequently, Kovalev (1972) named and further characterized the group, basing it upon the same three species and *D. ingrlica* Kovalev. This classification was followed by Chvála (1975) in a treatment of Scandinavian Tachydromiinae.

The last revision of the American *Drapetis* (Melander 1918) recognized no infrasubgeneric categories, although three members of the *D. assimilis* group were among the 11 valid species

then known. At that time, distinctions among *Drapetis* Meigen, *Crossopalpus* Bigot (= *Eudrapetis* Melander), and *Elaphropeza* Macquart were poorly understood, with the result that for the last 70 years, the American *D. assimilis* group species have been divided between *Drapetis* and *Crossopalpus*. The present paper corrects this unnatural arrangement by uniting the group and placing it within *Drapetis*, s. str.

None of the *D. assimilis* group species have Holarctic distributions, and despite study, none are yet known from the Neotropical Region.

METHODS

Specimens from the following collections were studied. Abbreviations given in parentheses are used in the text to denote depositories: (AC) Collection of the author; (AMNH) American Museum of Natural History; (CAS) California Academy of Sciences; (CIS) University of California

at Berkeley; (CNC) Canadian National Collection; (INHS) Illinois Natural History Survey; (MCZC) Museum of Comparative Zoology; (PHA) Paul H. Arnaud, Jr., Collection; (UCD) University of California at Davis; (UCR) University of California at Riverside; (IUCM) Iowa State University; (UK) University of Kansas; (USNM) United States National Museum of Natural History; (WSU) Washington State University. In listings of materials examined, all collection data preceding a specimen apply to that specimen, unless data that follow are in conflict.

Type specimens of all American species were examined and compared with original descriptions of types and with specimens and descriptions of this study. Descriptions of new species have been based solely on the holotype, with variation among individuals discussed in succeeding paragraphs.

Male genitalia have been drawn in ventrolateral and dorsolateral views, using a camera lucida; wings have been traced from microscope slide projections. Terminology of genitalia follows Griffiths (1972).

Drapetis Meigen

Drapetis Meigen, 1822:91. Type species: *Drapetis exilis* Meigen, 1822 (by monotypy).

A diagnosis of this genus is given elsewhere (Rogers 1983). *Drapetis* is not to be confused with its sister genera, *Crossopalpus* Bigot and *Elaphropeza* Macquart. *Drapetis discalis* Melander was originally described in *Eudrapetis* Melander, a junior synonym of *Crossopalpus*. It, and all species treated here, belong to *Drapetis* Meigen.

Drapetis assimilis Group

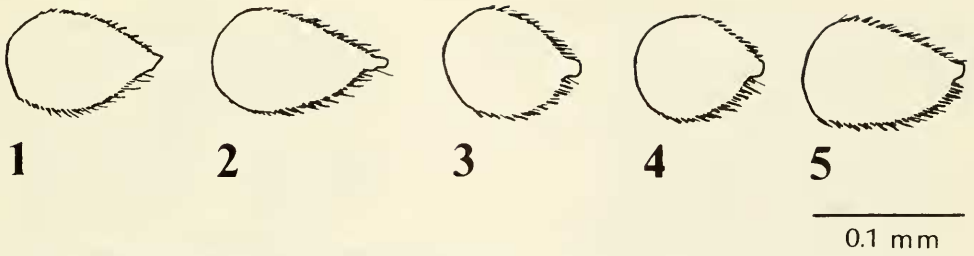
DESCRIPTION.—Males: Head round in frontal view; palpus light to dark brown; antenna uniformly brown, the second segment bearing a distal circling of setae with one ventral seta longer than all others in the circling, arista long in relation to the short third segment. Thorax scantily tomentose; when present, propleural tomentum not reaching anterior spiracle; pteropleuron polished; scutellar tomentum invading posterior edge of mesonotum between calli. Wing lacking maculations, veins R_{4+5} and M converging or subparallel distally; second basal (M) cell long, distally extending to below the junction of vein R_1 with the costa; rm crossvein attaching just prox-

imal of center of M cell; mc crossvein perpendicular to Cu or forming a slightly obtuse proximal angle at junction with Cu. Legs long; anterior femur tomentose ventrally; center femur lacking corrugation patterns, ventral surface bearing one or more longitudinal rows of long spines; posterior femur lacking strong anteapical spines on posterior surface; anterior and center tibiae tomentose along flexor surfaces; center tibia lacking a strong apical tooth; posterior tibia lacking true extensor bristles, apical lappet short, blunt, unarmed. Abdomen black, tergites lacking involutions on corners; sclerotization of tergite I interrupted near dorsal midline, other tergites entire; tergites IV and V laterally bearing flattened spines; sternites I, II, III, VI, VII, and VIII entire; sternite IV divided through center; sclerotization of segment VIII narrow and of uniform width dorsally; aedeagus short, concealed within perianthrium. Females: As in males, except all abdominal sternites entire.

The *D. assimilis* group is distinguished from all others by the unique combination of a long projecting seta on the venter of the second antennal segment, a long basal cell, and division of the male abdominal sternite IV. The antennal seta and basal cell have been used before to separate the *D. assimilis* group from other *Drapetis* in keys (Kovalev 1972); the importance of the divided sternite IV has been overlooked.

With the exception of *D. latipennis* Melander, all of the American *D. assimilis* group species have widely polished orbits, and the tomentum of the prothorax fails to reach the anteroventral lateral corner of the humerus. The center tibia bears two parallel rows of short spines along its flexor length in all American species except *D. torulosa* n. sp. Sternite V is divided in a few species, as noted in their respective descriptions.

None of the *D. assimilis* species have the long exerted aedeagus, divided sternite III, wing vein anomalies, nor tibial deformations that appear in various species allied to *D. divergens* Loew. Species related to *D. dividua* Melander have extensor spines on the posterior tibiae and a pedunculate structure articulating with the left perianthrium, both absent in the *D. assimilis* group. Members of the *D. naica* group (Rogers 1983) have an apical thorn on the flexor surface of the center tibia, widely divergent radial and medial veins, a short M cell, and oval head shape. Relatives of *D. exilis* Meigen lack the long ventral



FIGURES 1-5. Third antennal segments of paratype males. Figure 1, *Drapetis arnaudi* n. sp. Figure 2, *Drapetis destituta* n. sp. Figure 3, *Drapetis cerina* n. sp. Figure 4, *Drapetis solaris* n. sp. Figure 5, *Drapetis torulosa* n. sp.

seta on the second antennal segment, present in the *D. assimilis* and *D. naica* groups, and frequently have corrugations on the center femur.

KEY TO SPECIES OF THE *D. ASSIMILIS* GROUP

This key is designed for provisional identification of unmacerated males. Identifications should be confirmed by examination of cleared genitalia. Females are seldom identifiable.

(Males)

1. Anterodorsal surface of center femur bulging near proximal quarter, Figure 34; center tibia lacking flexor spines; genitalia, Figures 35, 36 *torulosa* n. sp.
- Anterodorsal surface of center femur shaped normally, Figure 31; center tibia bearing flexor spines 2
2. Posterior tibia bearing a group of long, downcurved setae about distal third of extensor surface, Figure 28; genitalia, Figures 29, 30 *latipennis* Melander
- Posterior tibia bearing short setae of nearly uniform length along extensor surface 3
3. Setae of anterior surface of center femur directed ventrally, Figure 31; genitalia, Figures 32, 33 *solaris* n. sp.
- Setae of anterior surface of center femur all directed distally 4
4. Halter yellow; one pair of vertical bristles 5
- Halter brown; two or three pairs of verticals 6
5. Ventral spines of center femur arranged in a single row; propleuron partially tomentose; genitalia, Figures 21-23 *discalis* Melander
- Ventral spines of center femur arranged in two or more rows; propleuron completely polished; genitalia, Figures 15, 16 *arnaudi* n. sp.
6. Gena obscured by eye in profile; anterior surface of center femur thickly whitish yellow tomentose; two pairs of vertical bristles; genitalia, Figures 17, 18 *cerina* n. sp.
- Gena narrowly visible beneath eye in profile; anterior surface of center femur polished; three pairs of verticals 7
7. Bearing a tubercle or a blunt raised projection near posteroventral proximal third of posterior femur; propleuron usually partially tomentose; abdominal tergites VI and VII partially polished; genitalia, Figures 24-27 *infumata* Melander
- Lacking a tubercle or prominence on posteroventral surface of posterior femur; propleuron completely polished; abdominal tergites VI and VII completely tomentose; genitalia, Figures 19, 20 *destituta* n. sp.

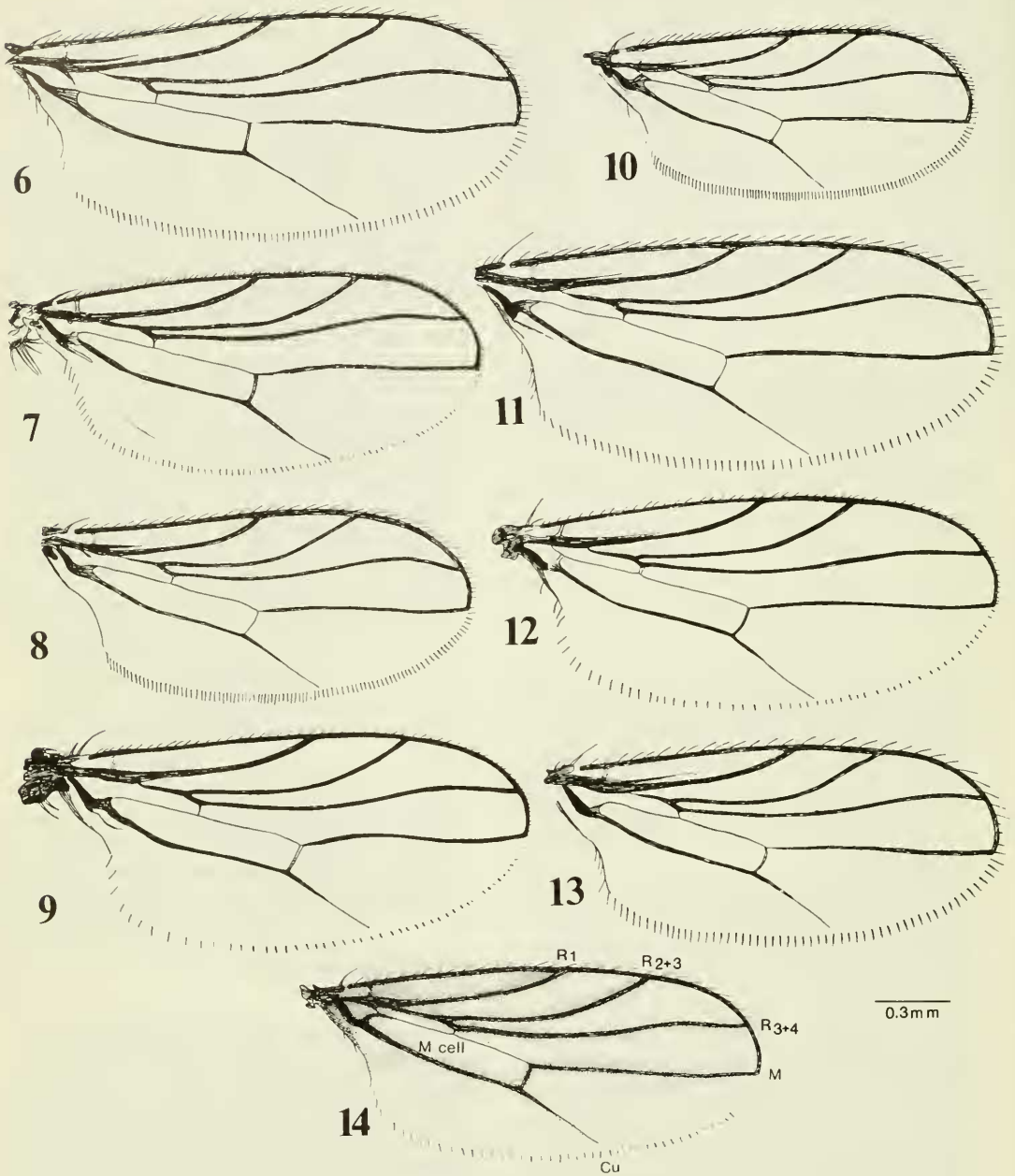
***Drapetis arnaudi* n. sp.**

(Figs. 1, 10, 15, 16)

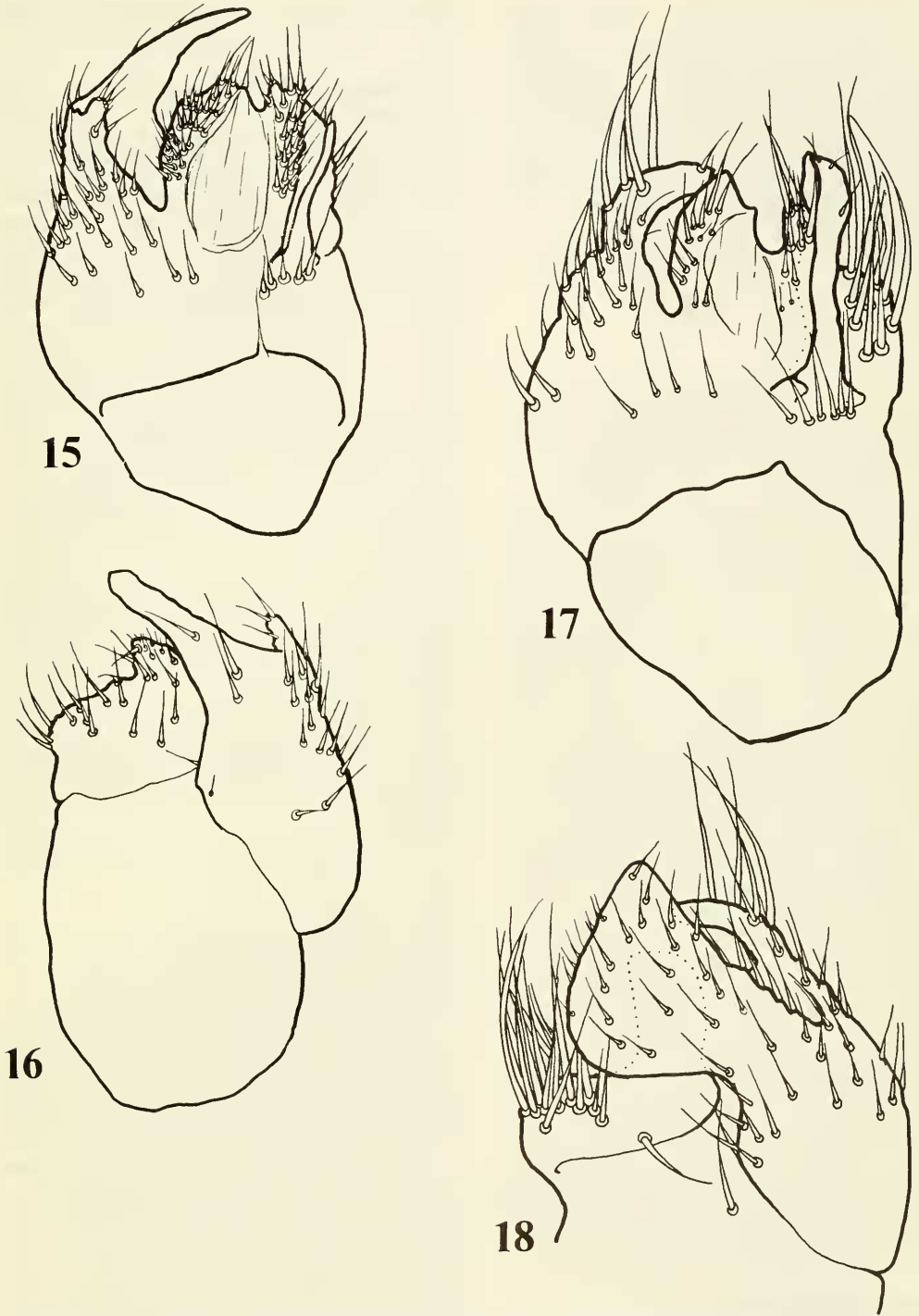
DIAGNOSIS.—One pair of vertical bristles; propleuron completely polished; halter yellow; male genitalia as in Figures 15, 16.

DESCRIPTION.—Male. Length 1.1 mm. Head dark brown; one pair of verticals; frons width at ventral end one-fifth length of third antennal segment; face linear, slightly narrowed toward center; gena entirely visible in profile; third antennal segment shaped as in Figure 1, arista five times its length. Thorax dark brown; propleuron completely polished. Wing 1.3 mm long, neuration as in Figure 10. Legs and coxae bright yellow, ultimate tarsal articles of each leg dark brown. Abdomen laterally bearing tiny flattened spines on segments IV and V.

TYPES.—Holotype: male (CAS 13448), USA:



FIGURES 6-14. Wing venation of males. Figure 6. *Drapetis cerina* n. sp., paratype. Figure 7. *Drapetis discalis*, Brewster Co., Texas. Figure 8. *Drapetis torulosa* n. sp., paratype. Figure 9. *Drapetis latipennis*, Orange Co., California. Figure 10. *Drapetis arnaudi* n. sp., paratype. Figure 11. *Drapetis solaris* n. sp., paratype. Figure 12. *Drapetis discalis*, Riverside Co., California. Figure 13. *Drapetis destituta* n. sp., paratype. Figure 14. *Drapetis infunata*, Chelan Co., Washington.



FIGURES 15-18. Genitalia of male paratypes. Figures 15 (ventrolateral view) and 16 (dorsolateral view). *Drapetis arnaudi* n. sp. Figures 17 (ventrolateral view) and 18 (dorsolateral view). *Drapetis cerina* n. sp.

labelled, "FLA: Highlands Co., Archbold Biol. Sta., 7.X.1964, P. H. Arnaud, Jr." Paratypes, same locality: 2 males, 10.X.1964 (CAS and AC), 1 male, 7.X.1964 (CAS), 1 male, 12.X.1964 (AC).

REMARKS.—The paratypes have three rows of ventral spines on the center femur, merging distally into two rows, not visible on the holotype. The posterior femur bears a single row of poorly developed ventral setae.

This species is named for its collector, Dr. Paul H. Arnaud, Jr.

Drapetis cerina n. sp.

(Figs. 3, 6, 17, 18)

DIAGNOSIS.—Two pairs of vertical bristles; gena obscured by eye in profile; halter brown; anterior surface of center femur whitish yellow tomentose; male genitalia as in Figures 17, 18.

DESCRIPTION.—Male. Length 1.8 mm. Head black; two pairs of verticals, outer pair short; frons width at ventral end one-seventh length of third antennal segment; face linear; gena obscured by eye in profile; third antennal segment shaped as in Figure 3, arista six times its length. Thorax black; one weakly developed humeral bristle; propleural tomentum present, narrowly failing to reach anteroventral lateral corner of humerus; halter dark brown. Wing 2.0 mm long, neuration as in Figure 6. Legs and coxae yellow, with a brownish cast in coxae and tarsi; anterior surface of center femur completely coated with translucent, waxy, whitish yellow tomentum, ventral surface bearing brown spines set in two irregular rows, spines longest near centers of rows; flexor spines of center tibia very poorly developed; posterior femur with one row of ventral setae and four long anteroventral distal bristles near knee. Abdomen laterally bearing erect flattened spines on tergites IV and V.

TYPES.—Holotype: male (USNM 762713), USA: labelled, "Las Vegas HS, 14.5, NM, H. S. Barber Collector." Paratype: 1 male, USA: New Mexico: Santa Fe Co., Santa Fe, VII (USNM).

REMARKS.—The anterior surface of the center femur looks much as though it were smeared with wax, producing greasy reflections. The adjective *cerina* refers to this waxy quality.

Drapetis destituta n. sp.

(Figs. 2, 13, 19, 20)

DIAGNOSIS.—Three pairs of strong vertical bristles; propleuron completely polished; halter

dark brown; abdominal tergites VI and VII completely tomentose; male genitalia as in Figures 19, 20.

DESCRIPTION.—Male. Length 14 mm. Head black; three verticals; frons width at ventral end one-sixth length of third antennal segment; face linear; gena entirely visible in profile; third antennal segment shaped as in Figure 2, arista four times its length. Thorax dark brown; propleuron completely polished; halter dark brown. Wing 1.6 mm long, neuration as in Figure 13. Legs and coxae yellow, except tarsi and posterior knees brown; center femur bearing two rows of strong, dark brown ventral spines, merging distally into one row at about half length, continuing along entire femur; posterior femur bearing two rows of long yellow setae along entire length, one row anteroventral, the other posteroventral. Abdomen laterally bearing long flattened spines on tergites IV and V; tergites VI and VII completely tomentose.

TYPES.—Holotype: male (CAS 13451), MEXICO: labelled, "MEXICO: Baja California: Agua Caliente (San Carlos), 18.5 km east of Maneadero, 6.VII.1973, Paul H. Arnaud, Jr." Paratype: 1 male, same data (PHA).

REMARKS.—Maceration of the paratype reveals that abdominal sternite V is divided. Recognition of this species relies primarily on genitalic differences; it lacks other unique characteristics.

Drapetis discalis (Melander)

(Figs. 7, 12, 21–23)

Eudrapetis discalis Melander, 1918:198.

Drapetis (Eudrapetis) discalis; Melander, 1928:310.

Drapetis (Crossopalpus) discalis; Melander, 1965:477.

DIAGNOSIS.—One pair of vertical bristles; male genitalia as in Figures 21–23.

REDESCRIPTION.—The original description will suffice to recognize *D. discalis* with the following corrections based on the lectotype: body shining brown; halter yellowish-clear; second, third, and fourth sections of costa proportioned 2.4:2.8:8.1; rm crossvein at five-twelfths of the length of second basal cell; outer two sections of vein M_{1+2} proportioned 1:2.

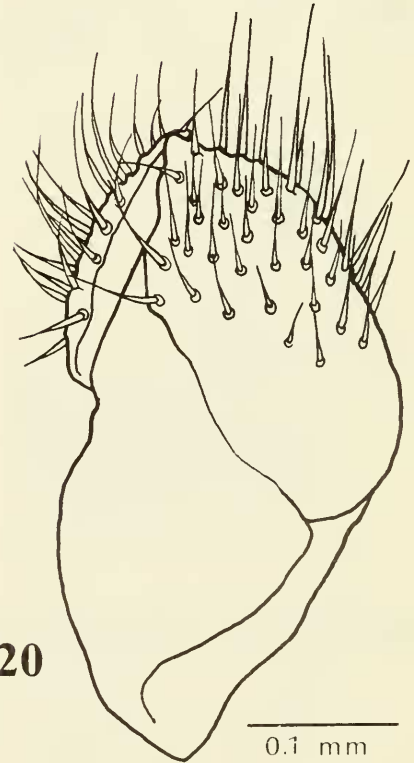
TYPES.—Melander labelled his Washington specimen "type," and his California specimen "paratype," but neglected to publish a designation of the holotype. Lectotype male (USNM), here designated, USA: labelled, "Wawawai Wash

22.VI." Paralectotype male (USNM), USA: California: Santa Clara Co., Palo Alto.

OTHER MATERIAL EXAMINED.—USA: California: Contra Costa Co., 1 male, Orinda Village, 18.VI.1970, E. I. Schlinger (AC); Monterey Co., 3 males, 25.IX.1934, A. L. Melander (USNM), 1 male, 8 km SW Greenfield, 3.V.1975, P. A. Rude (AC), 1 male, Soledad, 20.V.1956, H. R. Moffitt (UCD); Orange Co., 1 male, 14.VI.1929, P. W. Oman (UK); Riverside Co., 1 male, 8 km S of Sage, 16.IV.1965, C. A. Toschi (CIS), 2 males, Whitewater Cyn., 11.IV.1965, J. T. Doyen (CIS); San Bernardino Co., 1 male, Loma Linda, 13.V.1953, R. E. Ryckman (USNM), 1 male, Upper Santa Ana River, 28.IX.1953, A. L. Melander (USNM), 1 male, Mountain Home Cyn., 27.IX.1955, A. L. Melander (USNM), 1 male, Verdemont, 1.V.1946, A. L. Melander (USNM); San Diego Co., 1 male, 4.8 km WSW of Escondido, 23.III.1975, P. A. Rude (AC); Santa Barbara Co., 1 male, Santa Barbara, 16.VI.1951, K. W. Tucker (UCD); Santa Clara Co., 2 males, Los Gatos, off Stacia Street, *Quercus* trunk, 30.V/23.VII.1977, E. J. Rogers (AC), 5 males, Stanford, 19.XI.1952, P. H. Arnaud (PHA); Shasta Co., 1 male, McArthur, 12.X.1952, E. I. Schlinger (UCD); Ventura Co., 1 male, Saticoy, 5.V.1924, S. E. Flanders (CAS). Idaho: Nez Perce Co., 1 male, Lewiston Hill, 31.V.1924, A. L. Melander (USNM), 1 male, 30.VI.1975, E. J. Rogers (AC). Texas: Brewster Co., 2 males, Panther Junction, Big Bend Nat'l. Park, 1,067 m, 14.V.1959, J. F. McAlpine (CNC); Gillespie Co., 1 male, Pedernales River, 4.IV.1955, W. W. Wirth (USNM); San Patricio Co., 1 male, Padres Id. near Port Aransas, 23.III.1965, J. G. Chillcott (CNC). Utah: Cache Co., 1 male, Blacksmith Fork Cyn., 11.VIII.1975, G. F. Knowlton (UCD). Washington: Asotin Co., 1 male, Fields' Spring State Park, 31.VII.1971, W. J. Turner (WSU), 1 male, 27.4 km S of Anatonne, 594 m, fls. *Lonicera*, 15.IV.1977, W. J. Turner (WSU); Whitman Co., 3 males, Yakawawa Cyn., 11.3 km NW of Colton, 762 m, 25/27.VI.1977, W. J. Turner (WSU), 1 male, Big Almota Cyn., Almotia, 25.VII.1973, D. Corredor and S. Berenkamp (WSU). MEXICO: Baja California: 1 male, 9 km E of Hamilton Ranch Arr. Santo Domingo, 23.IV.1963, H. B. Leech and P. H. Arnaud (CAS).

REMARKS.—The gena is usually narrowly visible in profile (not in specimens from Brewster Co., Texas). The ventral half of the propleuron is usually tomentose (completely polished in all Texas specimens). Most individuals show a single, poorly distinguishable humeral bristle. The halter may be yellow or (rarely) brown. Ventral spines of the center femur are arranged in a single row, and the posterior femur bears a ventral row of setae. Abdominal sternite V is divided.

Distinguishing between *D. discalis* and *D. infumata* Melander is difficult. Cerci of the two species vary widely in shape (Figs. 21, 22, 24, 25), and Pacific Coast *D. discalis* occasionally have brown halteres, or infumated wings, or have the mc crossvein located proximad of the junction of vein R_1 with the costa, all as in *D. infumata*. Difference in the number of vertical bristles appears to be the best character for separation.

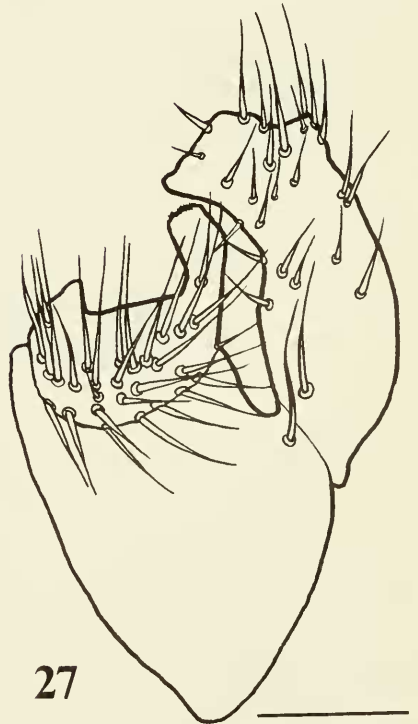
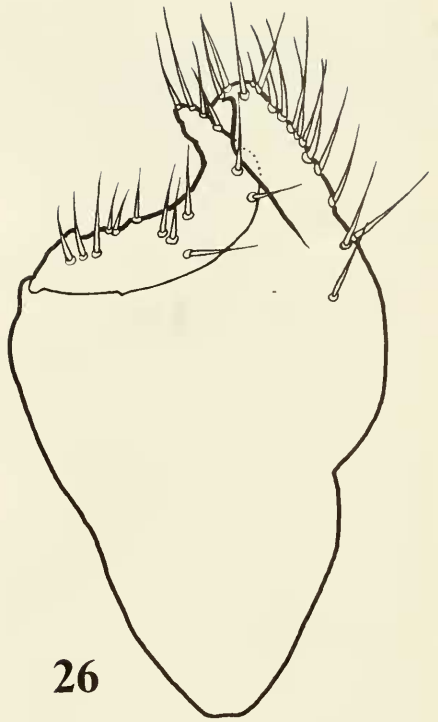
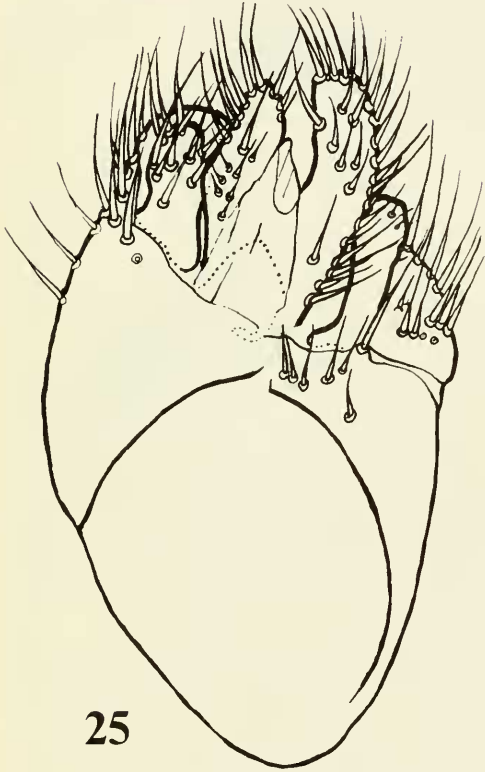


FIGURES 19, 20. Genitalia of paratype male *Drapetis desittuta* n. sp. Figure 19. Ventrolateral view. Figure 20. Dorsolateral view.



FIGURES 21-23. Genitalia of male *Drapetis discalis*. Figure 21 (ventrolateral view). Brewster Co., Texas. Figure 22 (ventrolateral view). Cerci, Monterey Co., California. Figure 23 (dorsolateral view). Santa Clara Co., California.

FIGURES 24-27. Genitalia of male *Drapetis infumata*. Figure 24 (ventrolateral view). Cerci, Chelan Co., Washington. Figure 25 (ventrolateral view). Monmouth Co., New Jersey. Figure 26 (dorsolateral view). Chelan Co., Washington. Figure 27 (dorsolateral view). Monmouth Co., New Jersey.



0.1 mm

Eudrapetis Melander (1918) is an obvious synonym of *Crossopalpus* Bigot (1857). *Crossopalpus* have produced genae, a single pair of ocellar bristles, and lack mesopleural setae. Like other *Drapetis*, *D. discalis* has short genae, two pairs of ocellars, and hairy mesopleurae.

Drapetis infumata Melander

(Figs. 14, 24–27)

Drapetis latipennis Melander, 1902:209 (in part, male paratype from Milwaukee, Wisconsin).

Drapetis infumata Melander, 1918:194.

Drapetis naica Melander, 1918:195 (in part, male paratype from Avon, Idaho).

DIAGNOSIS.—Three pairs of strong vertical bristles; a gentle prominence or pointed tubercle near posteroventral proximal third of posterior femur; male genitalia as in Figures 24–27.

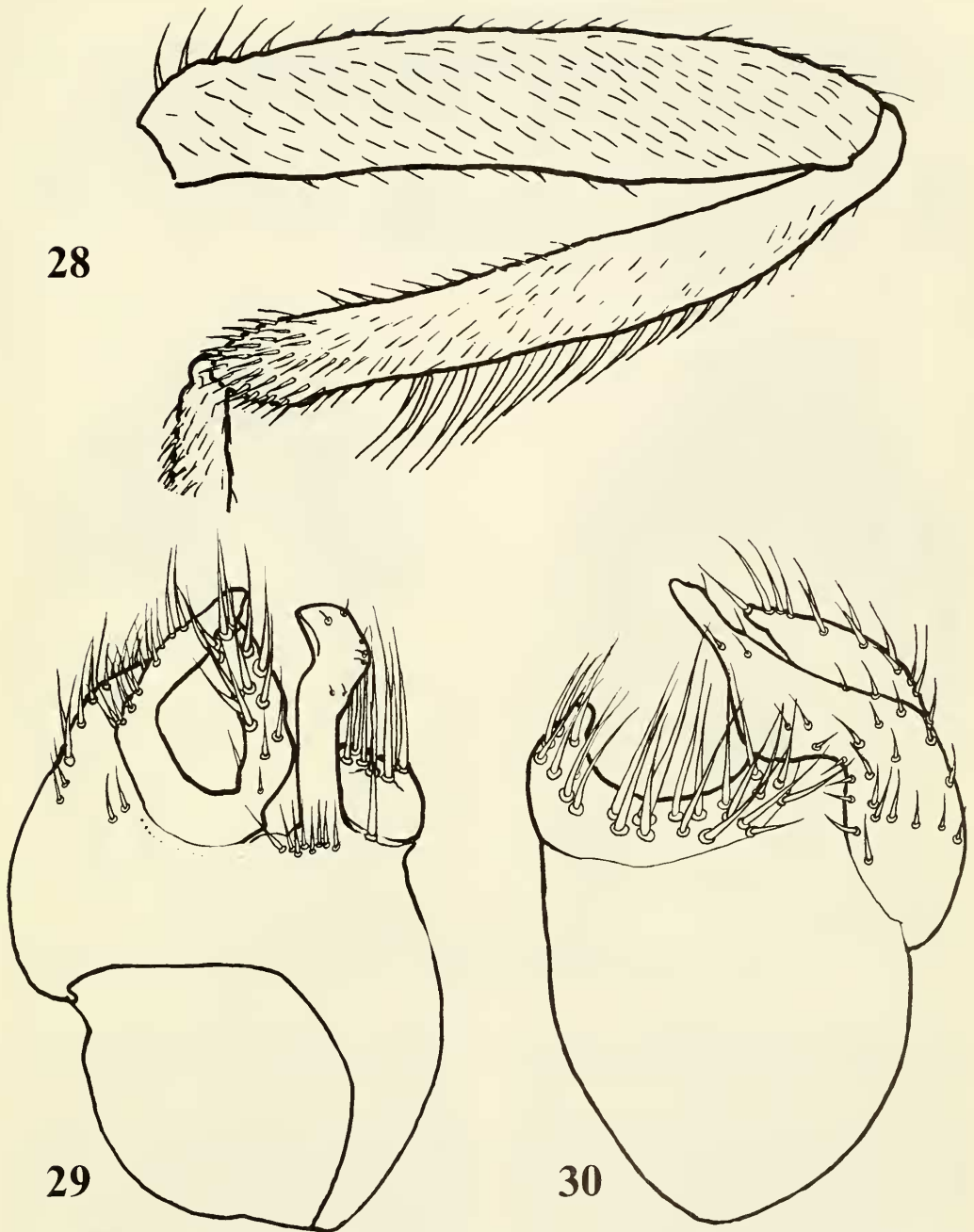
REDESCRIPTION.—Males. Length 1.2 to 1.5 mm. Head dark brown; three pairs of verticals; frons width at ventral end one-third to one-fifth length of third antennal segment. Thorax black to brown; one weak humeral bristle; propleural tomentum present, not attaining anteroventral lateral corner of humerus nor anterior spiracle; halter dark brown. Wing 1.6 to 1.9 mm long, occasionally infumated along veins, mc crossvein located proximad to junction of R_1 with costa, Figure 14. Legs and coxae dark yellow to dark brown, anterior femur and coxa and proximal areas of other femora lightest colored; center femur bearing a single row of ventral spines; posterior femur bearing one row of posteroventral setae along distal half, one row of short to long setae along entire ventral length, and a posteroventral tubercle or node near proximal third. Abdomen laterally bearing tiny flattened spines on tergites IV and V, closely appressed to body; abdominal sternite V usually divided; genitalia as in Figures 24–27.

TYPES—Holotype (*D. infumata*): female (USNM), CANADA: labelled, "Nelson, British Columbia." Paratype (*D. infumata*) female (USNM), USA: Priest Lake, Bonner Co., Idaho (may be one of two females from Priest Lake, collected 1.VIII.1916, but lacking a type label). Paratype (of *D. latipennis*) male (AMNH 729), USA: Milwaukee, Wisconsin, 23.VI.1895, W. M. Wheeler. Paratype (of *D. naica*) male, USA: Avon, Idaho (USNM).

OTHER MATERIAL EXAMINED.—USA: California: El Dorado Co., 1 male, Blodgett Forest, 21 km E Georgetown,

12.VIII.1975, P. A. Rude (AC); Humboldt Co., 1 male, Willow Creek, 12.VIII.1948, W. W. Wirth (USNM); Madera Co., 1 male, SE slope of Green Mtn., 2,316 m, 20.VIII.1971, H. B. Leech (CAS); Mono Co., 1 male, 8 km N Bridgeport, Huntton Forest Camp, 2,073 m, 22.VIII.1966, P. H. Arnaud (AC); Siskiyou Co., 1 male, Poker Flat, 1,536 m, 13.VIII.1966, H. B. Leech (CAS); Tuolumne Co., 1 male, Pinecrest, 11.VIII.1948, P. H. Arnaud (PHA). **Georgia:** Dade Co., 1 male, Cloudland Cyn. State Park, 8.V.1952, O. Peck (CNC). **Idaho:** Kootenai Co., 1 male, Carlin Bay, Lk. Coeur d'Alene, 16 km N of Harrison, 640 m, 14/20.VII.1981, W. J. Turner (AC), 1 male, 21/23.VIII.1977 (WSU), 1 male, 24/28.VII.1977 (WSU); Latah Co., 42 males, Lost Creek, 19.3 km ENE of Potlatch, 823 m, 5.VIII.1979, W. J. Turner (WSU), 6 males (AC), 1 male, 1.VII.1980 (WSU), 1 male, 7.VII.1980 (WSU), 1 male (AC), 7 males, 23.VII.1980 (WSU), 1 male (AC), 2 males, Styrchnine Creek, 24.1 km ENE Potlatch, 884 m, 1/3.VII.1980 (WSU), 1 male, 7/9.VII.1980 (WSU), 1 male, *Physocarpus*, 1.VII.1980 (WSU), 4 males, 11.3 km NNE of Moscow, 823 m, 24.VII.1980, W. J. Turner (WSU), 5 males, Big Meadow Rec. Area, 11.3 km N of Troy, 914 m, 31.VII.1979, W. J. Turner (WSU), 3 males (AC), 1 male, L. Sand Creek nr. Bonami Creek, 25.7 km E of Potlatch, 884 m, 9.VIII.1979, W. J. Turner (WSU). **Iowa:** Boone Co., 1 male, Ledges State Park, 23.VI.1961, J. L. Laffoon (UICM). **Michigan:** Midland Co., 1 male, 5.VII.1951, R. R. Dreisbach (USNM). **New Jersey:** Monmouth Co., 1 male, Long Branch, 11.VI., C. W. Johnson (MCZ). **Oregon:** Baker Co., 3 males, Up. Goose Creek, 54.7 km SE of Union, 1,268 m, 13/19.VII.1975, E. J. Davis (WSU), 1 male (AC), 1 male, Low. Goose Creek, 57.9 km SE of Union, 1,219 m, 13/19.VII.1975, E. J. Davis (WSU), 1 male, Velvet Creek, 22.1 km SE of Union, 1,439 m, 13/19.VII.1975, E. J. Davis (AC); Grant Co., 1 male, 40 km N Mt. Vernon, 24.VII.1974, P. H. Arnaud (CAS); Union Co., 1 male, Low. Lick Creek, 41.8 km SE of Union, 1,305 m, 21/23.VII.1977, E. J. Davis (WSU). **Virginia:** Montgomery Co., 1 male, Blacksburg, 640 m, 28.VI.1962, J. G. Chillcott (AC); Roanoke Co., 1 male, Mt. Roanoke, 18.V.1965, J. G. Chillcott (AC). **Washington:** Asotin Co., 1 male, 6.4 km S of Anatone, 1,097 m, 12.VIII.1980, W. Turner (WSU), 1 male, Fields' Spring State Park, 1,067–1,219 m, 30.VI.1975, W. J. Turner (WSU); Chelan Co., 1 male, Lucerne, 29.VIII.1919, A. L. Melander (USNM). **CANADA:** **Manitoba:** 1 male, Ninette, "*Betula glandulosa*, *Populus balsamifera* associate," 15.VII.1958, J. G. Chillcott (CNC). **Ontario:** Ottawa, 1 male, 26.VI.1958, J. G. Chillcott (AC), 1 male, 9.VI.1962, J. R. Vockeroth (CNC), 1 male, Maynooth, 22.VI.1953, J. F. McAlpine (CNC). **Quebec:** 1 male, Old Chelsea, Summit King Mtn., 351 m, 25.VI.1962, J. R. Vockeroth (CNC), 1 male, 9.VIII.1961 (CNC). **Saskatchewan:** 1 male, Uranium City, 59°34'N 108°36'W, 18.VI.1962, J. G. Chillcott (CNC), 1 male, Wallwort, 52°33'N 104°03'W, 20.VII.1942, J. D. Ritchie (UK).

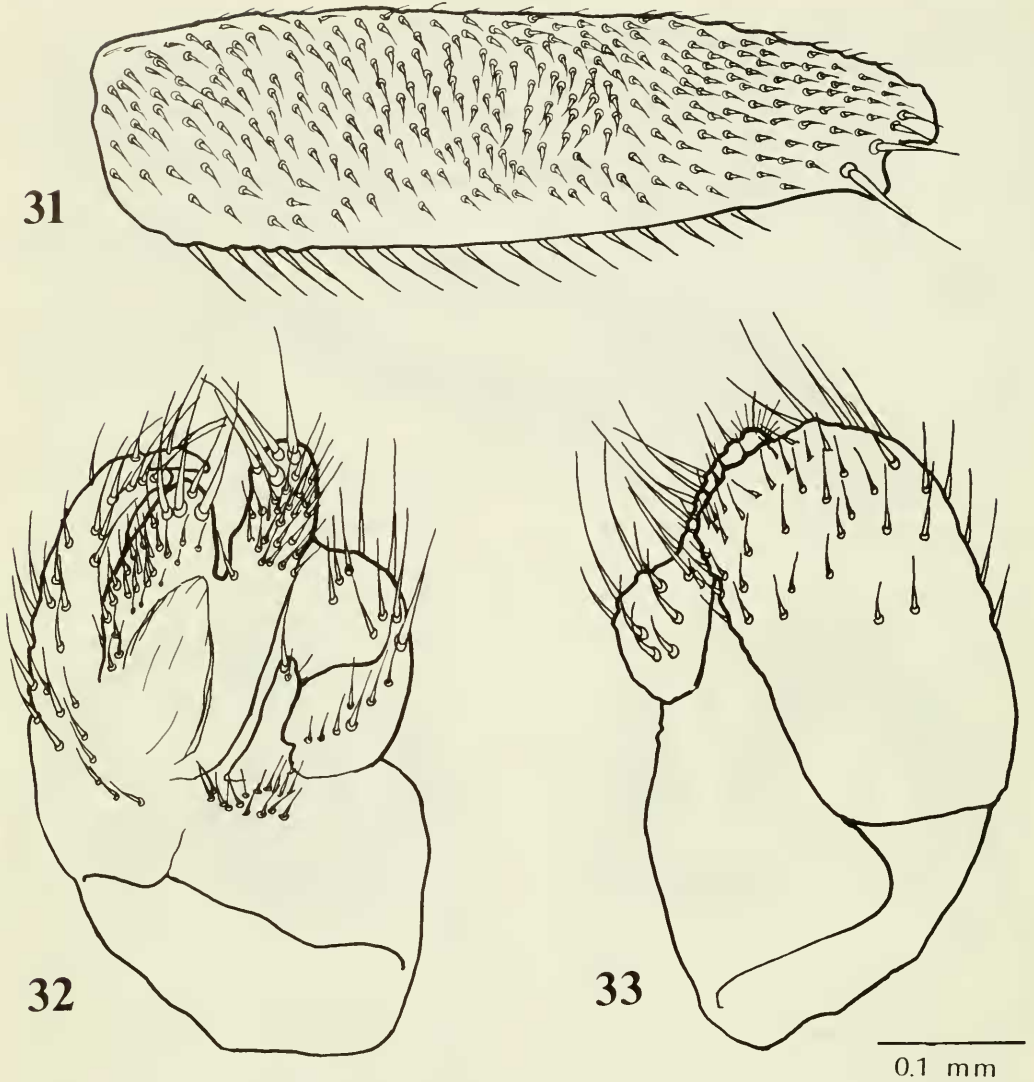
REMARKS.—Development of the ventral setae and tubercle of the posterior femur shows considerable variation. Specimens from the Atlantic Coast have long setae, a distinct nipple-like tubercle, and genitalia confirming substantially to Figures 25 and 27. Specimens collected between Ontario and California have short setae, and more often a gentle prominence rather than a tubercle, with genitalia resembling Figures 24 and 26. Cal-



FIGURES 28-30. *Drapetis latipennis*. Figure 28. Posterior view of male hind leg, Douglas Co., Kansas. Figures 29 (ventrolateral view) and 30 (dorsolateral view). Male genitalia, Orange Co., California.

ifornia material often shows well-developed tubercles and genitalia similar to Atlantic Coast specimens. Abdominal tergites VI and VII are mostly polished in specimens from Lost Creek,

Idaho. Specimens from Velvet Creek, Oregon, and Coeur d'Alene Lake, Idaho, lack all propleural tomentum. Sternite V is undivided in specimens from Big Meadow Creek, Idaho.



FIGURES 31–33. *Drapetis solaris* n. sp., paratype male. Figure 31. Anterior view of femur of center leg. Figures 32 (ventrolateral view) and 33 (dorsolateral view). Genitalia.

Individuals from the Pacific Coast have so far been collected only in mountainous regions, where wing infumation occurs only sporadically and is coincident with generalized melanism.

***Drapetis latipennis* Melander**

(Figs. 9, 28–30)

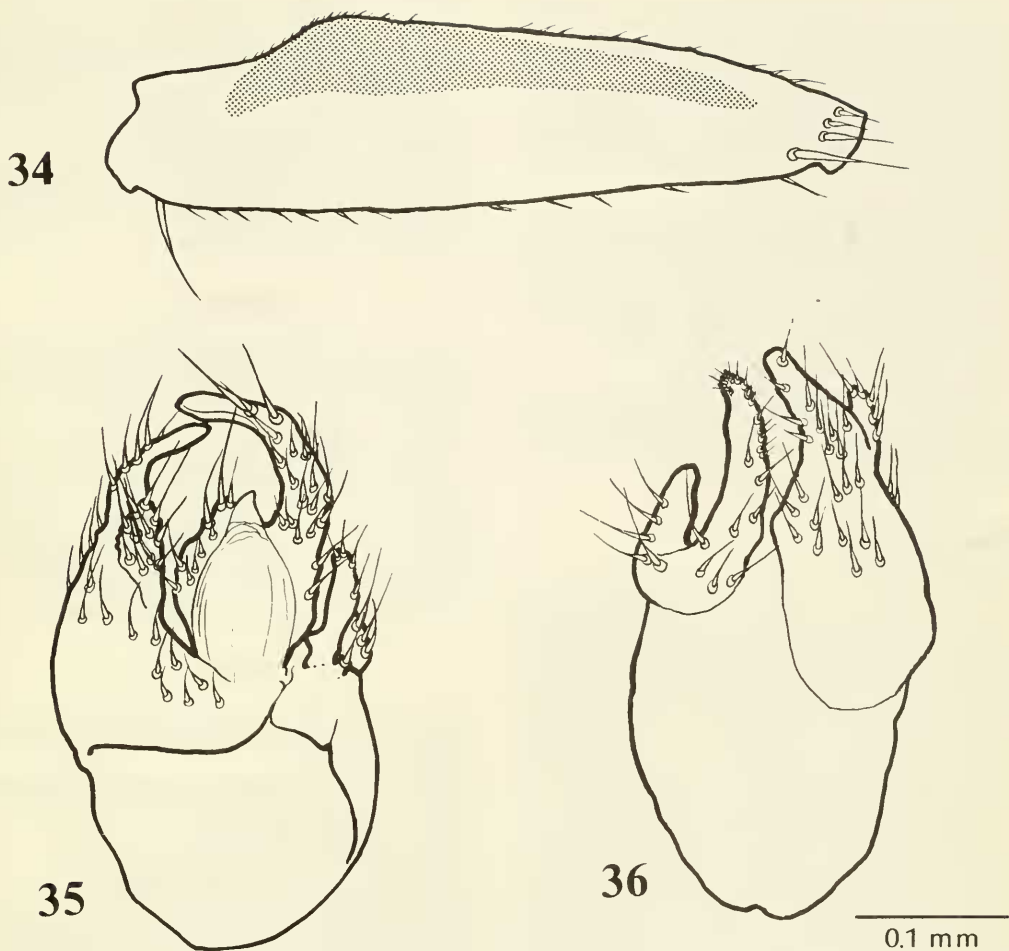
Drapetis latipennis Melander, 1902:209.

DIAGNOSIS.—Three strong pairs of verticals; gena obscured by eye in profile; propleural tomentum profuse, extending to anteroventral lateral corner of humerus; posterior femur bearing

five to seven long, sturdy anteroventral bristles along distal quarter; posterior tibia bearing a group of long, downturned setae near distal third of extensor surface; genitalia as in Figures 29, 30.

TYPES.—Lectotype (here designated): male (USNM), USA: labelled, “Lawrence Kans.” Paralectotypes, same locality: 1 male (USNM), 3 females (AMNH 730). A male from Milwaukee, Wisconsin (AMNH 729) included in the original type series is *Drapetis infumata*.

OTHER MATERIAL EXAMINED.—USA: **California:** Orange Co., 2 males, Irvine Ranch nr. Bonita Creek., “on *Platanus*,” 24.V.1963, E. I. Schlinger (UCR). **Illinois:** Champaign Co., 1



FIGURES 34-36. *Drapetis torulosa* n. sp., paratype male. Figure 34. Anterior view of center leg. Tomentose area indicated by stippling. Figures 35 (ventrolateral view) and 36 (dorsolateral view). Genitalia.

male, Urbana, 29.VI.1915 (IHNS). Kansas: Douglas Co., 1 male, Atherton (USNM). New York: Ulster Co., 1 male, Cherytown, 8/18.VIII.1971, P. and B. Wygodzinsky (AMNH).

REMARKS.—Flattened spines of abdominal tergites IV and V are long, thick and erect. The peculiar long setae on the posterior tibia are present in both sexes, but are shorter in females; *Drapetis assimilis* Meigen has less developed long setae in the same location.

***Drapetis solaris* n. sp.**

(Figures 4, 11, 31-33)

DIAGNOSIS.—Center femur bearing ventrally directed setae across center of anterior surface, Figure 31; genitalia as in Figures 32, 33.

DESCRIPTION.—Male. Length 1.6 mm. Head black; three pairs of verticals, outer two short; frons width at ventral end one-sixth length of third antennal segment; face linear; gena entirely visible in profile; third antennal segment shaped as in Figure 4, arista seven times its length. Thorax black, except posterior edge of mesopleuron and dorsal edge of sternopleuron dark brown; humerus bearing an inconspicuous bristle; propleural tomentum limited to ventral margin; halter light brown. Wing 1.6 mm long, neuration as in Figure 11. Legs and coxae chiefly dark brown, slightly lighter at knees, on tarsal articles and anterior tibia, and in ventral half of anterior coxa; center femur bearing a single row of ventral spines along entire femoral length, spines longer proxi-

mally, anterior surface of femur bearing ventrally directed setae and an unusually sturdy anteroventral distal bristle; center tibia very slightly bowed; a row of very long ventral setae along entire length of posterior femur. Abdomen laterally bearing long, flattened spines on tergites IV and V.

TYPES.—Holotype: male (CAS 13455), MEXICO: labelled, "MEXICO: Mexico: Teotihuacan Pyramid to the Sun. 27.XII.1970, P. H. and M. Arnaud/Coll. at flowers *Cassia tomentosa* L.f. Fam. Leguminosae Det. D. Breedlove." Paratypes: 3 males, same data (CAS).

REMARKS.—The face of one paratype is constricted ventrally, and another has no discernible outer vertical. The species is named in reference to its type locality.

***Drapetis torulosa* n. sp.**

(Figs. 5, 8, 34–36)

DIAGNOSIS.—Three pairs of strong verticals; anterodorsal surface of center femur with a tomentose callosity erupting at proximal quarter and gradually subsiding distally, Figure 34, posteroventral surface bearing one row of bristles, bristles lengthening distally; center tibia lacking flexor spines; genitalia as in Figures 35, 36.

DESCRIPTION.—Male. Length 1.4 mm. Head black; three pairs of verticals; frons width at ventral end one-eighth length of third antennal segment; face strongly constricted at ventral end; gena entirely visible in profile; third antennal segment shaped as in Figure 5, arista five times its length. Thorax dark brown; propleuron completely polished. three weak pale setae along vertical suture; halter dark yellow. Wing 1.6 mm long, neuration as in Figure 8. Legs and coxae yellow, except tarsi yellowish brown; center femur with one very strong, nearly erect anteroventral distal bristle near knee, and strong yellow posteroventral bristles in a single row, bristles lengthening distally along proximal three-quarters of femur; anterodorsal surface of center femur thickly tomentose, with a long swelling beginning at proximal quarter and distally subsiding across remaining length of femur; center tibia lacking flexor spines; posterior femur lacking ventral setae, bearing a rounded basal lump on posteroventral surface just distad of trochanter. Abdomen laterally bearing tiny flattened spines on tergites IV and V, closely appressed to body.

TYPES.—Holotype: male (CAS 13459), MEXICO: labelled, "MEXICO: Baja California: Agua Caliente (San Carlos), 18.5 km east of Maneadero, 6.VII.1973, Paul H. Arnaud, Jr." Paratypes, same data, 1 male (AC), 2 males (PHA).

REMARKS.—Abdominal sternite V of a macerated paratype is divided through the center. This species is named in reference to the peculiar modification of the center femur.

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LITERATURE CITED

- BIGOT, J. F. M. 1857. Essai d'une classification générale et synoptique de l'ordre des Insectes Diptères. Ann. Soc. Entomol. Fr. 26:551–564.
- CHVÁLA, M. 1975. The Tachydromiinae (Dipt. Empididae) of Fennoscandia and Denmark, Vol. 3. Scandinavian Science Press, Klampenborg. 336 pp.
- COLLIN, J. E. 1961. Empididae. British flies, Vol. VI. Cambridge University Press, Cambridge. 782 pp.
- GRIFFITHS, G. C. D. 1972. The phylogenetic classification of Diptera Cyclorrhapha, with special reference to the structure of the male postabdomen. Dr. W. Junk, The Hague. 340 pp.
- KOVALEV, V. G. 1972. Diptera of the genera *Drapetis* Mg. and *Crossopalpus* Bigot (Empididae) of the European part of the USSR. Entomol. Obozr. 61:173–196.
- MEIGEN, J. W. 1822. Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, Vol. III. Hamm. 416 pp.
- MELANDER, A. L. 1902. A monograph of the North American Empididae. Part I. Trans. Am. Entomol. Soc. 28:195–367, pls. 5–9.
- . 1918. The dipterous genus *Drapetis* Meigen (family Empididae). Ann. Entomol. Soc. Am. 11:183–221.
- . 1928. Diptera. Fam. Empididae. Genera Insectorum 185:1–434.
- . 1965. Family Empididae (Empidae, Hybotidae). Pp. 446–481 in A catalog of the Diptera of America north of Mexico. A. Stone, C. W. Sabrosky, W. W. Wirth, R. H. Foote, and J. R. Coulson, eds. U.S.D.A., Agric. Res. Serv., Agric. Handb. 276.
- ROGERS, E. 1983. The Neotropical species of *Drapetis* Meigen (Diptera: Empididae). Syst. Entomol. 8:431–452.